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SITE: Barite Hill
BREAK: 2.1
OTHER: _____

Date: Wednesday, September 05, 2007 11:10AM

Subject: Review of Removal Action / Proposed Pit Lake Mitigation at the Barite Hill Gold Mine ,
McCormick, South Carolina

**Removal Action / Proposed Pit Lake Mitigation at the Barite Hill Gold Mine , McCormick,
South Carolina**

The Emergency Response and Removal Branch (ERRB) has requested Superfund Remedial and Site Evaluation Branch (SRSEB) to provide an informal review of the proposed removal action / pit lake mitigation at the Barite Hill Gold Mine, McCormick, South Carolina. The primary purpose of this review is to determine if any of the proposed removal actions will complicate remedial actions that may be necessary to complete a future long-term site clean up. SRSEB in turn requested their contractors with hard rock mining expertise to assist in this review. The review is based on information provided by ERRB, a pending visit to the site and the Ridgeway Mine, SC (where similar pit mitigation remedies have resulted in favorable results) and available PA/SI documents. All information was not available to the reviewers due to time constraints and the review's informality. Information provided by ERRB includes: a white paper/ focused feasibility study, a power point presentation, and direct communication between the OSC and RPM. The attached comments contain a lot of questions and are meant to help focus those involved on the potential implications and consequences of the proposed actions. There may be and probably already are answers to some of these questions in available data. These questions may also help focus the collection of additional data necessary evaluate the proposed actions.

Attachments:

Barite Hill bullets_ed1.doc



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Comments on the Proposed Removal Action / Pit Mitigation at Barite Hill Mine,
McCormick, South Carolina, September 5, 2007

1. The suggested interim action makes assumptions concerning the sources of acidity to the pit -- 80% from waste rock pile, 10% from exposed pit walls, and 10% from iron cycling. What are these assumptions based on?
2. The lack of water balance information is a major limitation to this review at this point. The remedy is based on direct precipitation and surface run-off being the only sources of inflow into the pit. How likely is that to be the case? Are these sources sufficient to cause overtopping in a few years (assuming no major storm event)? Or is groundwater a potential or known source of inflow? Could run-on diversions be used to reduce the amount of water that runs into the pit?
3. The pH of an estimated 100,000,000 gallons of water in the pit are reported to have decreased from about 11 in July 1997 to about 2.0 to 2.2 by November 2003 and as low as -3.9 in 2006. Have calculations been made that demonstrate that run-off from a 50,000 cubic-yard pile of waste rock could account for that much acidity?
4. M.J. Gobla's white paper ("Pit Lake Formation and Mitigation") mentions (under option 4) an "ongoing release of selenium" from spent ore in the Heap Leach Pad and the landfill. This is given as the reason these materials should not be backfilled into the pit. Does the waste rock contain significantly less Se than the spent ore?
5. Will placing the waste rock into water with pH of -3.9 dissolve even more metals than are now mobilized by precipitation infiltration, and thus make the water quality of the pit water even worse than it is today? How much additional uncertainty does this add to the expected lime needs?
6. How much lime will it take to neutralize 100,000,000 gallons of water with a pH of -3.9? Is the range of costs for neutralization (\$300,000 to \$1,000,000) based on possible ranges of pH within the pit, ranges of mixing efficiencies that can be achieved, different treatment endpoints, or other variables?
7. Based on sample BH-004-SW presented in the PA/SI (this sample was taken at a time when the pit was described as having a pH of about 2), treatment to 99% metals reductions would result in water with concentrations of aluminum, cadmium, copper, and zinc that are likely to significantly exceed SC water quality criteria. Treatment efficiencies of this magnitude would likely not be realized for all metals and certainly would be difficult to achieve for metals such as cobalt, manganese, and zinc, which require pH of 8 or higher for efficient removal. Other metals, such as selenium, are also difficult to remove by lime dosing. What metals values will SCDHEC require in order to allow discharge of the upper 10 feet of the water column? Will they place limits on sulfate, hardness, TDS, and TSS? Can these limits be achieved? Will they permit a mixing zone in the unnamed tributary receiving stream?
8. When the pit fills to the spillway, there would presumably be a continual discharge (with increases after every precipitation event.) Will there be an evaluation of the potential impacts of these discharges on receiving waters downstream to Strom Thurmond Lake?

9. Placing 50,000 cubic yards of waste rock into the pit would be (more-or-less) irreversible. It may be appropriate to consider a temporary action to reduce water and/or oxygen infiltration into the waste rock such as temporary encapsulation / isolation of the waste rock pile under a relatively impermeable cover, application of bactericides to slow microbial oxidation, or placement of a chemical cap to reduce infiltration.
10. If 50,000 cubic yards of waste rock is placed in the pit, would it be appropriate to amend the material with lime or other neutralizing agents prior to placement? How will this be achieved? How will the material be placed to ensure that it gets to the desired depth within the pit?
11. Are there material handling concerns with regard to oxidative heat within the pile? Could it potentially combust spontaneously when interior portions of the pile are exposed to the atmosphere (as is the case with mineral concentrates from hard rock mining sites)?
12. At what depth does the pit become anoxic and sufficiently low in ferric iron that continued oxidation of the waste rock would be limited? Would the backfilled waste rock be entirely in that zone? Would the backfilling operation upset this interface?
13. There are several significant differences between Barite Hill and Gilt Edge, Sleeper, and other mine pits where comparable remedies have reported success. For example, there was extensive treatability testing at these other mines, which is not presented in the information provided. In addition, Barite Hill's negative pH is orders of magnitude more acidic than the other pit lakes, and this may cause significantly different behavior.
14. There should be geotechnical studies completed prior to design and construction of the spillway to ensure the structure will be permanent and that water conveyed across the spillway will be routed to Hawes Creek without unexpected erosion, channel overtopping, or other consequences downstream. What storm event will the spillway and downstream channel be sized to hold?